WISCONSIN DEPARTMENT OF NATURAL RESOURCES

2023 Comprehensive Summary Report
Shawano, Loon, Washington Lakes, Shawano Channel and Wolf River Pond,
Shawano County (WBIC's 322800, 322600, 322500, 323700, 323800)

Introduction And Objectives

In 2023, the Wisconsin Department of Natural Resources (DNR) conducted a comprehensive fish survey of Shawano Lake and the surrounding waters in order to provide insight and direction for the future fisheries management of this system. Comprehensive fish surveys include both spring fyke netting and spring electrofishing surveys. Primary sampling objectives of these surveys are to characterize species composition, relative abundance, and size structure. The following report is a brief summary of the activities conducted, general status of fish populations and future management options for Shawano Lake, which includes survey data from Loon, Washington Lakes, Shawano Outlet and Wolf River Pond.

DNR Contact

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Lake Information

Combined Acres: 6,830
Max. Depth: 40
Shoreline Miles: 33.6
Public Access: 10 Boat Landings

Regulations

Statewide Regulations for all species, except walleye which follows countywide regulation bag limit of 3 and minimum length of 18 inches

SURVEY INFORMATION

Site Location	Survey Dates	Water Temperature (°F)	Target Species	Gear	Number of Nets	Effort
Shawano Outlet	3/23/2023 - 4/11/2023	38 - 48	northern pike walleye	Fyke Net	9	98 net nights
Wolf River Pond	4/09/2023 - 4/13/2023	42 - 49	northern pike walleye	Fyke Net	6	20 net nights
Loon Lake	4/11/2023 - 4/21/2023	46 - 58	northern pike walleye	Fyke Net	4	38 net nights
Washington	4/11/2023 - 4/18/2023	43 - 57	northern pike walleye	Fyke Net	2	14 net nights
Shawano Lake	4/13/2023 - 4/18/2023	43 - 57	northern pike walleye	Fyke Net	13	61 net nights
Shawano Lake	4/18/2023	50	walleye	Boomshocker	N/A	17.2 miles
Washington Lake	4/18/2023	49	walleye	Boomshocker	N/A	1.5 miles
Loon Lake	4/21/2023	48	walleye	Boomshocker	N/A	3.58 miles
Shawano Lake	4/20/2023 - 5/04/2023	46 - 50	muskellunge	Fyke Net	5	57
Washington Lake	4/20/2023 - 5/04/2023	46 - 50	muskellunge	Fyke Net	2	28
Loon Lake	4/26/2023 - 5/04/2023	46 - 54	muskellunge	Fyke Net	2	16
Shawano Outlet	5/16/2023	65	bass/panfish	Boomshocker	N/A	6.11 miles
Wolf River Pond	5/17/2023	63	bass/panfish	Boomshocker	N/A	4.19 miles
Shawano Lake	5/23/2023 - 5/25/2023	65 - 70	bass/panfish	Boomshocker	N/A	7.5 miles
Washington Lake	5/23/2023	70	bass/panfish	Boomshocker	N/A	0.5 miles
Loon Lake	5/15/2023	64	bass/panfish	Boomshocker	N/A	3.59 miles

Metric Descriptions

- **Catch per unit effort (CPUE) is an index used to measure fish population relative abundance**, which simply refers to the number of fish captured per unit of distance or time. For netting surveys, we typically quantify CPUE by the number and size of fish per net night. For electrofishing, we quantify CPUE as the number caught per mile of water electrofished. CPUE indexes are compared to statewide data by percentiles and within lake trends. For example, if a CPUE is in the 90th percentile, it is higher than 90% of the other CPUEs in the state.
- **Proportional Stock Density (PSD) is an index used to describe the size structure of fish populations.** It is calculated by dividing the number of quality size fish by the number of stock size fish for a given species. PSD values between 40 - 60 generally describe a balanced fish population.
- **Length frequency distribution (LFD) is a graphical representation of the number or percentage of fish captured by half-inch or one-inch size intervals.** Smaller fish (or younger age classes) may not always be represented in the length frequency due to different habitat usage or sampling gear limitations.
- **Mean age at length is an index used to assess fish growth.** Calcified structures (e.g., otoliths, spines or scales) are collected from a specified length bin of interest (e.g., 7.0-7.5 inches for bluegill). Mean age is compared to statewide data by percentile, with growth characterized by the following benchmarks: slow (<33rd percentile); moderate (33rd to 66th percentile); and fast (>66th percentile).

Survey Method

- Shawano Lake and surrounding waters were sampled according to spring netting I (SNI), spring netting II (SNII), spring electrofishing 1 (SEI), and spring electrofishing II (SEII) protocols as outlined in DNR Fisheries Monitoring Protocols. The primary goal of the spring fyke netting I survey is to count and measure adult walleye, northern pike, and mark adult walleyes to estimate walleye abundance. The primary objective of the spring netting II survey is to count, measure, and mark adult muskellunge. The primary objective of the spring electrofishing II survey is to count and measure adult largemouth bass, smallmouth bass, and panfish. Other fish species may be encountered during each survey but are not the primary focus.
- Boom shockers were used to electrofish 21.89 miles of shoreline during SEII surveys. Gamefish were collected and measured throughout, and panfish were collected and counted along random transects within the survey.
- Fyke nets were deployed in areas of the lake that contained spawning habitat or were likely travel areas for northern pike, walleye and muskellunge. All newly captured individuals were marked with a fin clip or PIT tag. Aging structures (spines/otoliths) were taken from a sample of walleye, northern pike, bluegill, black crappie and yellow perch for age and growth analyses.
- In conjunction with the 2023 comprehensive survey, Shawano Lake and the surrounding waters are in the beginning stages of a PIT tag array study. In the spring of 2024 arrays will be placed to track movement of spawning activity for walleye, northern pike and muskellunge. 809 walleye, 433 northern pike and 41 muskellunge were tagged with PIT tags.

Northern Pike

- Northern pike (*Esox lucius*) are a common predatory fish species found across many Wisconsin waterbodies. Northern pike spawn in areas of emergent vegetation at approximately 34-40°F water temperatures. Fyke netting is the preferred sampling gear for northern pike. All results presented for northern pike are from spring fyke netting surveys.

2023 SIZE STRUCTURE METRICS

Total Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
552	19.3	9.3 - 32.2	14.0 and 21.0	524	117	31	34th	Low - Moderate

RELATIVE ABUNDANCE (CPUE = NUMBER PER NET NIGHT)

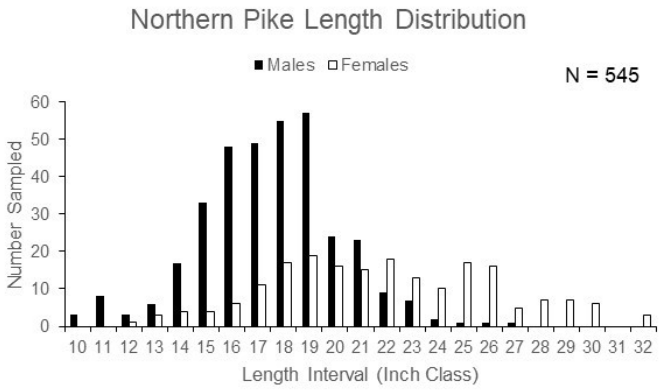
Total Sampled	2006	2010	2014	2018	2023	Historical Median	2023 Statewide Percentile Rank	2023 Abundance Rating
624	3.6	2.9	4.1	1.2	2.9	2.9	66th	Moderate

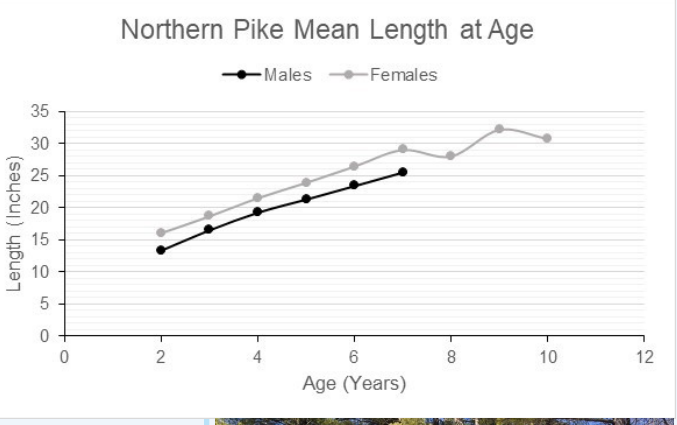
SIZE STRUCTURE (PSD) TRENDS

PSD by Year					Historical Median
2006	2010	2014	2018	2023	
28	17	34	38	31	31

2023 GROWTH METRICS

Number Sampled	Length Bin (inches)	Sex	Mean Age	Age Range	Percentile Rank	Growth Rating
18	18.0-18.9	M	3.6	3 - 4	38th	Slow - Moderate
13	18.0-18.9	F	3.4	3 - 8	26th	Slow
8	21.0-21.9	M	4.3	4 - 5	38th	Moderate
8	21.0-21.9	F	3.8	3 - 5	49th	Moderate
1	26.0 - 26.9	M	6	6	42nd	Moderate
8	25.5-26.4	F	5.4	4 - 7	35th	Moderate





Species Summary

- Shawano Lake and its surrounding waters support a moderately dense northern pike population, with catch rates in 2023 averaging 2.9 fish per net night. This rate places the population in the 66th percentile statewide. Since 2006, northern pike catch rates in this area have remained relatively stable.
- The size structure of the northern pike population in the 2023 survey was assessed as low to moderate, with a Proportional Stock Density (PSD) of 31. This places the population in the 34th percentile statewide. While individual fish lengths fell within the typical range for northern pike (males: 10-27 inches; females: 12-32 inches), a higher proportion of smaller individuals contributed to the lower overall PSD score. Over the past several surveys, the size structure of the northern pike population in this area has remained relatively stable.
- Aging structures were collected from 260 individuals, and were collected from all of the different waterbodies. Similar growth rates were observed throughout the waterbodies when compared against each other. Growth rates of northern pike in Shawano Lake and the surrounding waters are considered moderate when compared to other lakes throughout Wisconsin.
- To track the movement and habitat usage of northern pike, 433 individuals were implanted with PIT tags. These small electronic tags, about the size of a grain of rice, were placed under the skin near the stomach. In 2024, arrays will be set up in tributaries and between waterbodies to monitor the tagged fish and gather data on their movements.


Photo Credit: DNR Staff

Walleye

- Walleye (*Sander vitreus*) are a predatory fish species found throughout many Wisconsin waterbodies. Typically walleye migrate to spawn in areas of rock or gravel substrate at approximately 40-50°F water temperatures. Fyke netting and electrofishing are both suitable gears for capturing walleye, thus data presented is from both gear types.

2023 SIZE STRUCTURE METRICS

Total Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
961	19.0	8.6 - 27.4	10.0 and 15.0	960	927	97	87th	High

RELATIVE ABUNDANCE (CPUE = NUMBER PER NET NIGHT)

Total Sampled	2006	2010	2014	2018	2023	Historical Median	2023 Statewide Percentile Rank	2023 Abundance Rating
1057	38.6	6.6	4.7	6.1	5.0	6.1	60th	Moderate

SIZE STRUCTURE (PSD) TRENDS

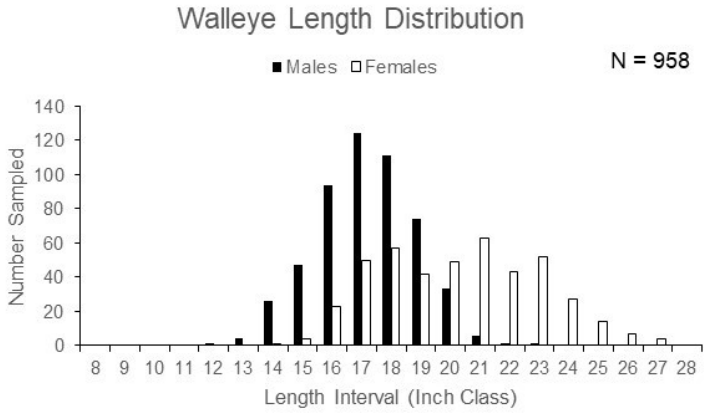
PSD by Year					Historical Median
2006	2010	2014	2018	2023	
97	99	99	96	97	97

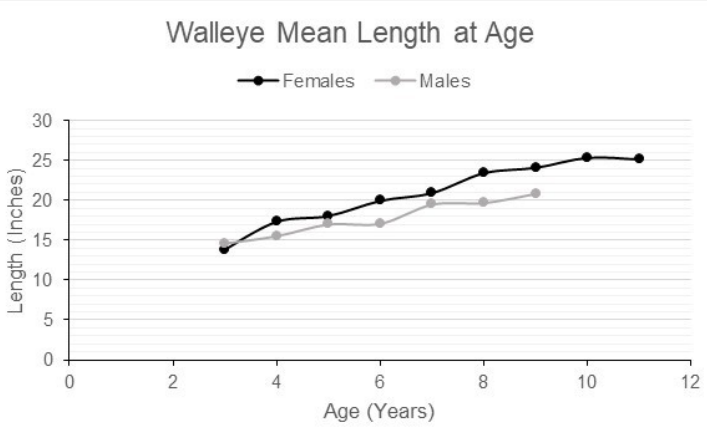
2023 ADULT ABUNDANCE (POPULATION ESTIMATE)

Marked	Captured	Recaptures	Population Estimate (95% CI)	Number per Acre
960	115	15	5257 (3,616 - 8224)	0.8

2023 GROWTH METRICS

Number Sampled	Length Bin	Sex	Mean Age	Age Range	Percentile Rank	Growth Rating
9	18.0-18.9	M	6.2	5 - 8	77th	Moderate - Fast
8	18.0-18.9	F	5.8	4 - 7	60th	Moderate





Species Summary

- Shawano, Washington, and Loon Lakes support a low-density walleye population, with catch rates averaging 5.0 fish per net night in 2023. This rate places the population in the 60th percentile statewide. Walleye catch rates in the Shawano Lake area have remained relatively stable over time, with CPUE values of 4.7 and 6.1 recorded in 2014 and 2018, respectively.
- While the goal for a stocked walleye fishery is 1.5 per acre or higher, Shawano Lake and surrounding waters is estimated to be 0.8 per acre. Still, 0.8 walleye per acre in the 2023 survey is an improvement from 0.6 and 0.2 in 2018 and 2014 respectively.
- Size structure of walleye in the 2023 survey was high with a PSD of 97 which ranks in the 87th percentile when compared to lakes statewide. The current walleye size structure found in Shawano, Loon and Washington Lakes is similar to the 2014 and 2018 surveys.
- We conducted an OTC evaluation and determined that in 2016 all YOY walleye sampled in Shawano Lake had originated from a lakeside hatchery run by Walleyes for Tomorrow volunteers out of Cecil. From 2011 to 2017 all state hatchery fish were given a fin clip. Based off of those numbers we were able to estimate that 34% of the adult population in 2023 originated from the state hatchery stockings and 66% originated from the lakeside hatchery in Cecil. Further evaluation and parental genetics analysis needs to be done in the future to confirm these results from year to year.
- A unique aspect of this year's survey was the increased effort to sample areas suspected of walleye movement during the spring. To track walleye movements, 809 individuals were implanted with PIT tags. These small electronic tags were placed under the skin near the stomach. In the spring of 2024, arrays will be set up between lakes and tributaries to monitor the tagged fish and gather data on their movements. This study will help identify important walleye habitats and inform future habitat improvement projects. The PIT tag study captured 227 walleye in Loon Lake and 98 in Washington Lake, providing valuable information on walleye distribution and movements within the system.

Muskellunge

- Muskellunge (*Esox masquinongy*) are a predatory fish species found across the three main drainage basins of Wisconsin but are historically more common in the northern half of the state. Muskellunge typically spawn in shallow nearshore areas at approximately 50-60°F water temperatures. Fyke netting is the preferred sampling gear for muskellunge. All results presented for muskellunge are from spring fyke netting surveys.

2023 SIZE STRUCTURE METRICS

Total Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
46	38.2	19.3 - 49.8	30.0 and 38.0	43	22	51	17th	Low

RELATIVE ABUNDANCE (CPUE = NUMBER PER NET NIGHT)

Total Sampled	2006	2010	2014	2018	2023	Historical Median	2023 Statewide Percentile Rank	2023 Abundance Rating
46	0.3	0.5	0.9	0.4	0.2	0.4	32nd	Low

SIZE STRUCTURE (PSD) TRENDS

PSD by Year					Historical Median
2006	2010	2014	2018	2023	
55	75	74	63	51	63

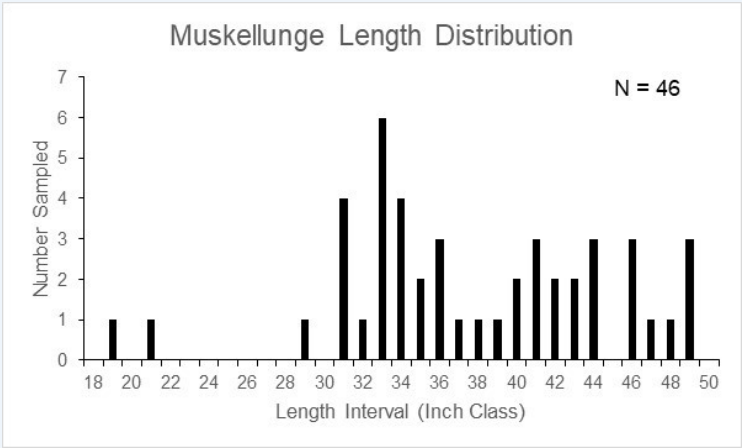



Photo Credit: DNR Staff

Species Summary

- Shawano Lake and connecting waterbodies support a low density muskellunge population with a catch rate of 0.2 fish per net night. A catch rate of 0.2 fish per net night ranks in the 32nd percentile when compared to muskellunge catch rates statewide. Relative abundance estimates have increased slightly since the last survey in 2018.
- Size structure of muskellunge in the 2023 Shawano Lake system survey was low with a PSD of 51 which ranks in the 17th percentile when compared to lakes statewide. This is a slight decrease from what was found in the 2018 survey and lower than most past surveys.
- The Shawano Lake system muskellunge population can be characterized by a low number of larger individuals resulting in a low quantity high quality fishery. There were also a number of individuals from more recent stocking events represented in the sample that may supplement the adult population in the future.
- The 2023 muskellunge netting survey in the Shawano Lake system was planned to be year one (marking event) of a two year survey protocol used to estimate adult muskellunge population numbers.
- In 2019 and 2021 roughly 3,000 large fingerling spotted muskies were stocked into Shawano Lake. In 2021 a little over 30% of the muskellunge stocked were implanted with PIT tags. The PIT tags will give a better understanding of growth rates, movement between lakes and the river, and in time a better understanding of the muskellunge population in the Shawano Lake system.

Largemouth Bass

- Largemouth bass (*Micropterus salmoides*) are a common predatory fish species found in many Wisconsin waterbodies. Largemouth bass typically spawn in shallow nearshore areas consisting of sand/mud or gravel substrate at approximately 60-70°F water temperatures. Electrofishing is the preferred sampling gear for largemouth bass. All results presented for largemouth bass are from spring electrofishing surveys.

2023 SIZE STRUCTURE METRICS

Waterbody	Total Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
Wolf River Pond	7	12.6	7.5 - 15.9	8.0 and 12.0	6	2	33	16th	Low
Shawano Outlet	88	13.0	6.4 - 19.6	8.0 and 12.0	84	61	73	71st	Moderate - High
Shawano Lake	112	11.3	3.2 - 18.6	8.0 and 12.0	98	48	49	34th	Moderate
Washington Lake	6	14.2	11.7 - 16.2	8.0 and 12.0	3	2	67	63rd	Moderate
Loon Lake	13	11.3	4.0 - 17.8	8.0 and 12.0	9	6	67	63rd	Moderate

2023 RELATIVE ABUNDANCE (CPUE = NUMBER PER MILE)

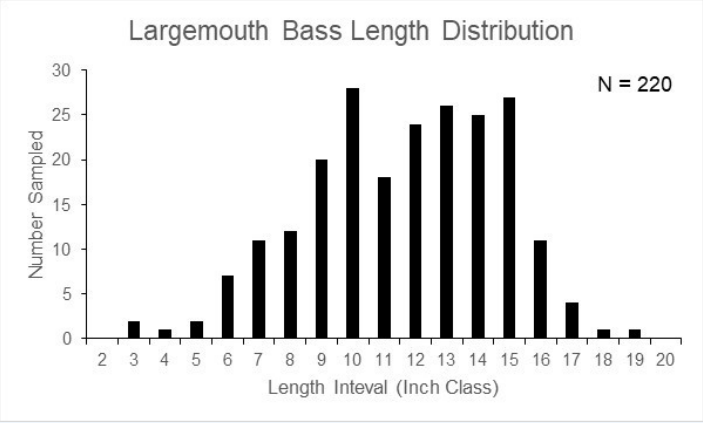
Waterbody	CPUE Total	Percentile Rank	Overall Abundance Rating	Length Index	Length Index CPUE	Length Index Percentile Rank	Length Index Abundance Rating
Wolf River Pond	1.7	15th	Low	≥ 14.0 inches	1.0	27th	Low
Shawano Outlet	14.4	50th	Moderate	≥ 14.0 inches	5.9	71st	Moderate - High
Shawano Lake	14.5	50th	Moderate	≥ 14.0 inches	3.2	53rd	Moderate
Washington Lake	6.0	30th	Low	≥ 14.0 inches	4.0	59th	Moderate
Loon Lake	3.6	23rd	Low	≥ 14.0 inches	1.4	33rd	Low

SHAWANO AND WASHINGTON LAKES SIZE STRUCTURE (PSD) TRENDS

PSD by Year					Historical Median
2006	2010	2014	2018	2023	
88	72	67	52	49	67

SHAWANO AND WASHINGTON LAKES RELATIVE ABUNDANCE TRENDS (CPUE = NUMBER PER MILE)

CPUE by Year					Historical Median
2006	2010	2014	2018	2023	
40.7	20.8	15.1	13.1	14.0	15.1



Species Summary

- Shawano Lake and the Shawano Outlet support moderately dense largemouth bass populations, with catch rates in 2023 averaging 14.5 and 14.4 fish per mile of electrofishing, respectively. These rates place the populations in the 50th percentile statewide. While the relative abundance of largemouth bass in these areas has been declining since 2006, the proportion of fish larger than 14 inches remains moderate to high compared to statewide values. Catch rates in Wolf River Pond, Loon Lake, and Washington Lake are lower than average when compared to other Wisconsin waterbodies.
- Size structure of largemouth bass in Shawano Lake was moderate with a PSD value of 49 which ranks in the 34th percentile when compared to statewide values. When compared to recent surveys on Shawano Lake, largemouth bass PSD values have been declining since 2006.
- The current status of the largemouth bass population on the Shawano Lake system is average. Moderate relative abundance and a moderate size structure results in an angling opportunity to catch largemouth bass of all sizes including harvestable >14.0 inches but minimal fish larger; >18.0 inches size classes. Largemouth bass size structure and abundance levels have been declining since early 2000's.

Black Crappie

- Black crappie (*Pomoxis nigromaculatus*) are a common panfish species distributed widely across many Wisconsin waterbodies. Black crappie typically spawn in nearshore areas consisting of detritus, sand/mud or gravel substrate at approximately 58-68°F water temperatures. Electrofishing and fyke netting can be effective sampling gear for black crappie and therefore, results from both gears are presented for black crappie

2023 SIZE STRUCTURE METRICS

Waterbody	Gear	Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock	Quality	PSD	Percentile Rank	Size Rating
Wolf River Pond	Fyke Netting	309	7.5	4.0 - 13.1	5.0 and 8.0	279	91	33	26th	Low
Wolf River Pond	Electrofishing	6	9.1	5.2 - 12.4	5.0 and 8.0	6	4	66	71st	Moderate - High
Shawano Outlet	Fyke Netting	49	8.4	5.1 - 11.7	5.0 and 8.0	49	33	67	55th	Moderate
Shawano Outlet	Electrofishing	6	7.3	5.8 - 9.1	5.0 and 8.0	6	2	33	47th	Moderate
Shawano Lake	Fyke Netting	147	7.2	4.3 - 11.5	5.0 and 8.0	139	51	37	30th	Low
Shawano Lake	Electrofishing	24	7.5	6.1 - 9.7	5.0 and 8.0	24	8	33	47th	Moderate
Washington Lake	Fyke Netting	174	7.2	4.8 - 10.8	5.0 and 8.0	170	52	31	25th	Low
Washington Lake	Electrofishing	14	7.3	5.6 - 9.4	5.0 and 8.0	14	4	29	42nd	Moderate
Loon Lake	Fyke Netting	459	6.9	4.1 - 11.7	5.0 and 8.0	454	94	21	14th	Low
Loon Lake	Electrofishing	33	6.5	3.2 - 8.9	5.0 and 8.0	24	11	46	56th	Moderate

2023 ELECTROFISHING CPUE (NUMBER PER MILE)

Waterbody	CPUE Total	Percentile Rank	Overall Abundance Rating	Length Index	Length Index CPUE	Length Index Percentile Rank	Length Index Abundance Rating
Wolf River Pond	3.2	34th	Moderate	≥ 8.0 inches	2.1	49th	Moderate
Shawano Outlet	4.0	43rd	Moderate	≥ 8.0 inches	1.3	36th	Moderate
Shawano Lake	6.7	53rd	Moderate	≥ 8.0 inches	5.3	69th	Moderate - High
Washington Lake	28.0	84th	Moderate - High	≥ 8.0 inches	8.0	79th	Moderate - High
Loon Lake	20.4	79th	Moderate - High	≥ 8.0 inches	6.8	74th	Moderate - High

SHAWANO LAKE ELECTROFISHING TRENDS CPUE (NUMBER PER MILE)

CPUE by Year					Historical Median
2006	2010	2014	2018	2023	
35.3	7.0	0.5	3.0	6.7	6.7

SHAWANO LAKE ELECTROFISHING SIZE STRUCTURE (PSD) TRENDS

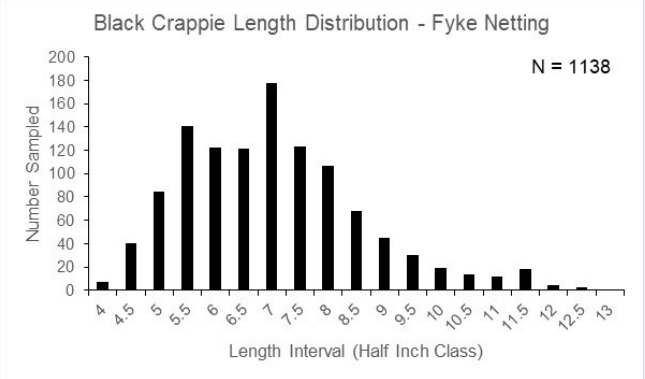
PSD by Year					Historical Median
2006	2010	2014	2018	2023	
69	29	0	33	33	33

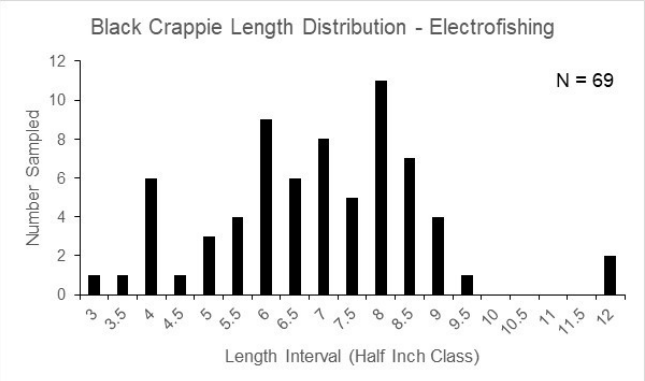
SHAWANO LAKE FYKE NETTING CPUE TRENDS (NUMBER PER NET NIGHT)

2006	2010	2014	2018	2023	Historical Median	2023 Statewide Percentile Rank	2023 Abundance Rating
5.5	6.4	45.7	17.2	12.1	12.1	77th	Moderate - High

SHAWANO LAKE SIZE STRUCTURE (PSD) TRENDS FYKE NETTING

PSD by Year					Historical Median
2006	2010	2014	2018	2023	
64	62	20	40	37	37

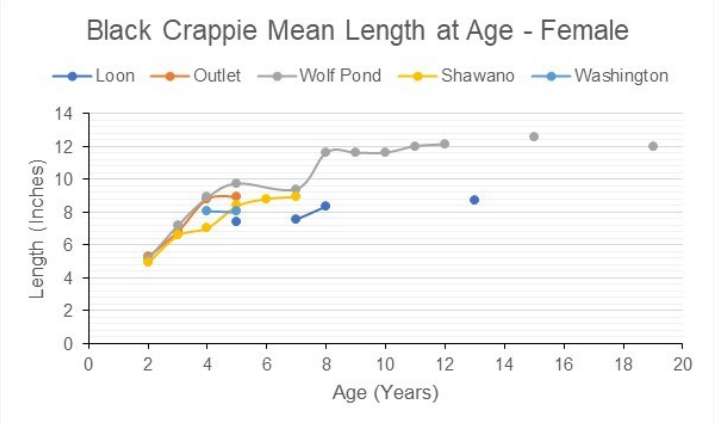


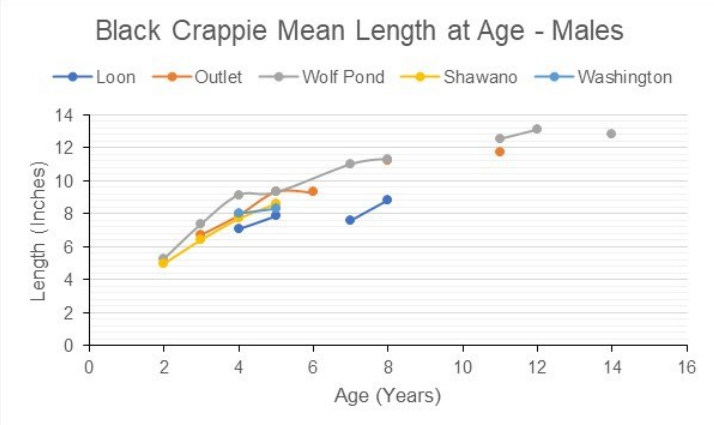


Black Crappie

- Black crappie (*Pomoxis nigromaculatus*) are a common panfish species distributed widely across many Wisconsin waterbodies. Black crappie typically spawn in nearshore areas consisting of detritus, sand/mud or gravel substrate at approximately 58-68°F water temperatures. Electrofishing and fyke netting can be effective sampling gear for black crappie and therefore, results from both gears are presented for black crappie

2023 GROWTH METRICS							
Waterbody	**Sample (n)**	**Length Bin (inches)**	**Sex**	**Mean Age**	**Age Range**	**Percentile Rank**	**Growth Rating**
Wolf River Pond	4	8.0 - 8.9	M	4	3 - 5	80th	Moderate - Fast
Wolf River Pond	6	8.0 - 8.9	F	3.7	3 - 5	82nd	Moderate - Fast
Wolf River Pond	3	10.0 - 10.9	M	6.7	5 - 8	41st	Moderate
Wolf River Pond	2	10.0 - 10.9	F	6.5	5 - 8	51st	Moderate
Shawano Lake	5	8.0 - 8.9	M	4.6	4 - 5	53rd	Moderate
Shawano Lake	10	8.0 - 8.9	F	5.5	4 - 7	41st	Moderate
Washington Lake	3	8.0 - 8.9	M	4.7	4 - 5	50th	Moderate
Washington Lake	2	8.0 - 8.9	F	4.5	4 - 5	61st	Moderate
Shawano Outlet	6	8.0 - 8.9	F	4.5	4 - 5	61st	Moderate
Loon Lake	2	8.0 - 8.9	M	6.5	5 - 8	22nd	Slow
Loon Lake	6	8.0 - 8.9	F	8.3	5 - 13	9th	Slow





Species Summary

- Shawano Lake supports a moderate density black crappie population with catch rates of 12.1 fish per net night from the fyke netting survey and 6.7 fish per mile of electrofishing from the boom shocking survey. Catch rates of 12.1 per net night and 6.7 per mile rank in the 77th and 53rd percentiles, respectively. Washington and Loon Lakes support moderate to high densities while the Wolf River Pond and the Shawano Outlet have lower densities, but are have moderate densities when compared to statewide data.
- Size structure of black crappie in Shawano Lake and surrounding waters differed by gear and waterbody. In the fyke netting and electrofishing surveys, most individuals captured ranged from 5-9 inches but some of the waterbodies had large year classes of smaller fish. In regards to Shawano Lake, length data from the fyke netting survey resulted in a PSD value of 37 which is in the 30th percentile when compared to data statewide. Length data collected in from the electrofishing survey resulted in a PSD value of 33 which is in the 47th percentile when compared to statewide values.
- Population trends from previous electrofishing and fyke netting surveys on the Shawano Lake indicate that size structure has remained similar to the historical median from surveys dating back to 2006. However, black crappie year class strength typically fluctuates from year to year and can portray differing data, depending on the particular years data.
- Growth metrics calculated from age estimates indicate that black crappie (8.0-8.9 inches) in Shawano Lake, Washington Lake and Shawano Outlet grow at a moderate rate for both male and female individuals. While growth of black crappie in Loon Lake is slow compared to statewide metrics for both males and females in the 8.0–8.9 inch bin. However, black crappie in Wolf River Pond showed moderate - fast growth, and larger individuals were available for aging in the 10.0-10.9 inch bin.

Bluegill

- Bluegill (*Lepomis macrochirus*) are a very common panfish species distributed widely across many Wisconsin waterbodies. Bluegill typically spawn in nearshore areas consisting of sand/mud or gravel substrate at approximately 67-80°F water temperatures. Electrofishing is the standard sampling gear for bluegill, but fyke netting can show some information as well. When comparing bluegill populations to other waterbodies electrofishing data is to be used for our surveys.

2023 SIZE STRUCTURE METRICS

Waterbody	Gear	Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock	Quality	PSD	Percentile Rank	Size Rating
Wolf River Pond	Fyke Netting	399	6.2	3.6 - 10.0	3.0 and 6.0	399	221	56	48th	Moderate
Wolf River Pond	Electrofishing	111	5.4	3.0 - 7.8	3.0 and 6.0	111	32	29	44th	Moderate
Shawano Outlet	Fyke Netting	207	6.4	3.5 - 8.6	3.0 and 6.0	207	148	71	67th	Moderate - High
Shawano Outlet	Electrofishing	103	5.2	3.1 - 7.8	3.0 and 6.0	103	31	30	46th	Moderate
Shawano Lake	Fyke Netting	554	6.1	3.4 - 8.9	3.0 and 6.0	554	322	58	50th	Moderate
Shawano Lake	Electrofishing	217	5.4	2.5 - 7.8	3.0 and 6.0	212	76	36	53rd	Moderate
Washington Lake	Fyke Netting	203	5.0	3.6 - 7.2	3.0 and 6.0	203	32	16	9th	Low
Washington Lake	Electrofishing	32	4.4	1.7 - 6.3	3.0 and 6.0	29	3	10	14th	Low
Loon Lake	Fyke Netting	288	5.9	3.7 - 7.9	3.0 and 6.0	288	149	52	43rd	Moderate
Loon Lake	Electrofishing	158	5.1	2.3 - 8.8	3.0 and 6.0	147	36	24	34th	Moderate

2023 ELECTROFISHING CPUE (NUMBER PER MILE)

Waterbody	CPUE Total	Percentile Rank	Overall Abundance Rating	Length Index	Length Index CPUE	Length Index Percentile Rank	Length Index Abundance Rating
Wolf River Pond	58.7	39th	Moderate	≥ 7.0 inches	10.6	61st	Moderate
Shawano Outlet	68.7	43rd	Moderate	≥ 7.0 inches	6.7	52nd	Moderate
Shawano Lake	123.3	62nd	Moderate	≥ 7.0 inches	8.0	56th	Moderate
Washington Lake	64.0	42nd	Moderate	≥ 7.0 inches	0	-	-
Loon Lake	97.5	54th	Moderate	≥ 7.0 inches	6.2	51st	Moderate

SHAWANO LAKE ELECTROFISHING TRENDS CPUE (NUMBER PER MILE)

CPUE by Year					Historical Median
2006	2010	2014	2018	2023	
134.7	81.5	105.5	90.0	123.3	105.5

SHAWANO LAKE ELECTROFISHING SIZE STRUCTURE (PSD) TRENDS

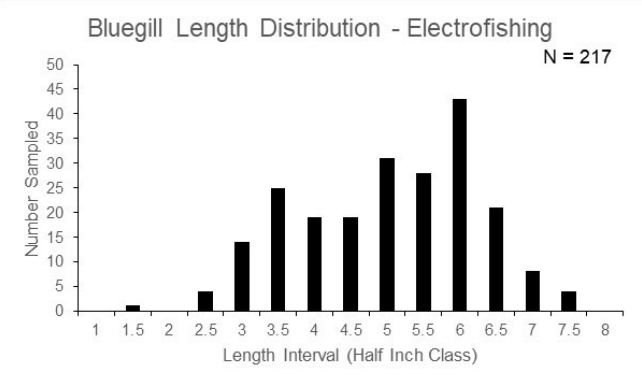
PSD by Year					Historical Median
2006	2010	2014	2018	2023	
33	30	36	21	36	33

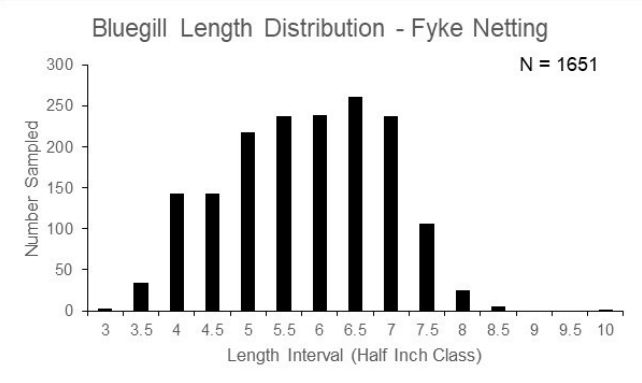
SHAWANO LAKE FYKE NETTING CPUE TRENDS (NUMBER PER NET NIGHT)

2006	2010	2014	2018	2023	Historical Median	2023 Statewide Percentile Rank	2023 Abundance Rating
21.8	14.6	22.5	26.7	7.6	21.8	52nd	Moderate

SHAWANO LAKE SIZE STRUCTURE (PSD) TRENDS FYKE NETTING

PSD by Year					Historical Median
2006	2010	2014	2018	2023	
64	72	46	75	58	64

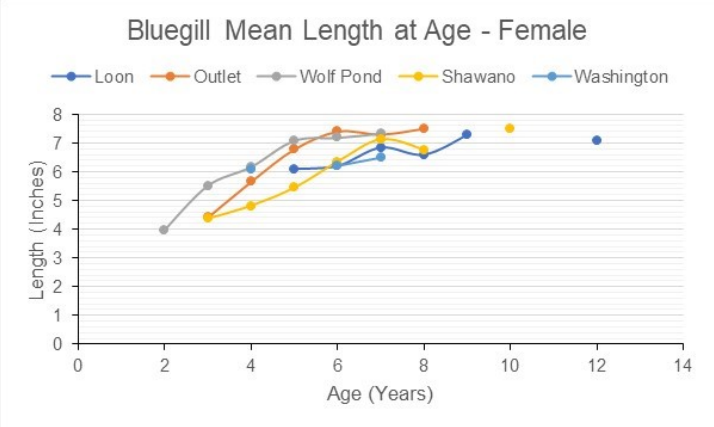


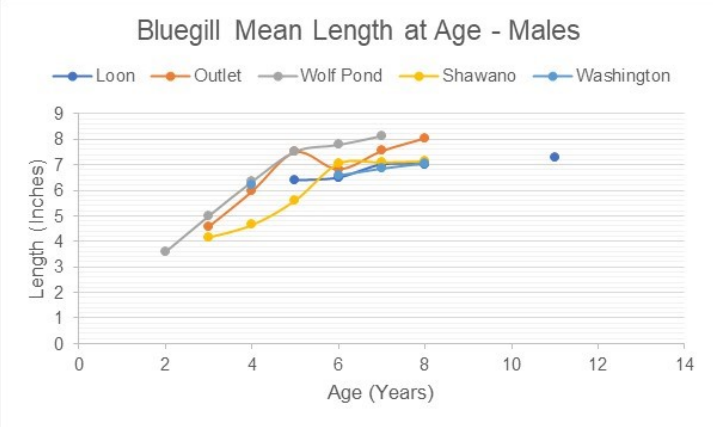


Bluegill

- Bluegill (*Lepomis macrochirus*) are a very common panfish species distributed widely across many Wisconsin waterbodies. Bluegill typically spawn in nearshore areas consisting of sand/mud or gravel substrate at approximately 67-80°F water temperatures. Electrofishing is the standard sampling gear for bluegill, but fyke netting can show some information as well. When comparing bluegill populations to other waterbodies electrofishing data is to be used for our surveys.

2023 GROWTH METRICS							
Waterbody	**Sample (n)**	**Length Bin (inches)**	**Sex**	**Mean Age**	**Age Range**	**Percentile Rank**	**Growth Rating**
Wolf River Pond	6	6.0 - 6.9	M	4.2	4 - 5	70th	Moderate - Fast
Wolf River Pond	19	6.0 - 6.9	F	4.3	3 - 7	72nd	Moderate - Fast
Wolf River Pond	15	7.0 - 7.9	M	4.9	4 - 7	78th	Moderate - Fast
Wolf River Pond	2	7.0 - 7.9	F	5	5	84th	Moderate - Fast
Shawano Lake	13	6.0 - 6.9	M	6.4	5 - 8	9th	Slow
Shawano Lake	9	6.0 - 6.9	F	6.6	5 - 8	15th	Slow
Shawano Lake	8	7.0 - 7.9	M	7.4	6 - 8	12th	Slow
Shawano Lake	8	7.0 - 7.9	F	8.1	7 - 10	15th	Slow
Shawano Outlet	15	6.0 - 6.9	M	4.7	4 - 7	59th	Moderate
Shawano Outlet	10	6.0 - 6.9	F	4.5	3 - 5	69th	Moderate - Fast
Shawano Outlet	12	7.0 - 7.9	M	5.3	4 - 8	64th	Moderate
Shawano Outlet	5	7.0 - 7.9	F	6.2	5 - 8	49th	Moderate
Washington Lake	6	6.0 - 6.9	M	6.3	5 - 8	10th	Slow
Washington Lake	7	6.0 - 6.9	F	6.4	5 - 7	17th	Slow
Washington Lake	3	7.0 - 7.9	M	7.5	7 - 8	11th	Slow
Loon Lake	8	6.0 - 6.9	M	6.1	5 - 8	12th	Slow
Loon Lake	5	6.0 - 6.9	F	6.4	5 - 8	17th	Slow
Loon Lake	6	7.0 - 7.9	M	7.8	7 - 11	8th	Slow
Loon Lake	3	7.0 - 7.9	F	9.3	7 - 12	7th	Slow





Species Summary

- Overall the Shawano Lake system supports a moderate density bluegill population with catch rates of 58.7 fish per mile from the electrofishing in the Wolf River Pond to 123.3 per mile in Shawano Lake. In Wolf River Pond a catch rate of 58.7 per mile ranks in the 39th percentile and 123.3 per mile in Shawano Lake ranks in the 62nd percentile. Bluegill density in Shawano Outlet, Washington, and Loon Lakes falls between that of Wolf River Pond and Shawano Lake. However, Wolf River Pond has the highest density of larger bluegill (> 7.0 inches)
- Size structure of bluegill in Shawano Lake and surrounding waters differed by waterbody. In the electrofishing surveys, most individuals captured ranged from 3.0 - 6.0 inches but Wolf River Pond, Shawano Outlet and Shawano Lake had the highest proportions of fish greater than 6.0 inches. In regards to Shawano Lake, length data collected from the electrofishing survey resulted in a PSD value of 36 which is in the 53rd percentile when compared to statewide values.
- Population trends from previous electrofishing and fyke netting surveys on Shawano Lake indicate that size structure has remained similar to the historical median from surveys dating back to 2006.
- Growth metrics calculated from age estimates indicate that bluegill in Shawano, Washington and Loon Lakes grow at a slow pace for both males and females up to 7.9 inches. While growth of bluegill in Wolf River Pond and Shawano Outlet is moderate to fast compared to statewide metrics for both males and females in the 7.0 - 7.9 inch bin.

Pumpkinseed

- Pumpkinseed (*Lepomis gibbosus*) are a common panfish species distributed widely across many Wisconsin waterbodies. Pumpkinseed typically spawn in nearshore areas consisting of sand or gravel substrate at approximately 60-70°F water temperatures. Electrofishing and fyke netting can be effective sampling gear for pumpkinseed and therefore, results from both gears are presented for pumpkinseed.

2023 SIZE STRUCTURE METRICS

Waterbody	Gear	Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock	Quality	PSD	Percentile Rank	Size Rating
Wolf River Pond	Fyke Netting	74	5.9	3.6 - 7.6	3.0 and 6.0	74	39	53	66th	Moderate
Wolf River Pond	Electrofishing	17	5.5	3.5 - 6.8	3.0 and 6.0	17	7	41	58th	Moderate
Shawano Outlet	Fyke Netting	62	6.4	4.3 - 7.4	3.0 and 6.0	62	47	76	86th	Moderate - High
Shawano Outlet	Electrofishing	65	5.5	2.8 - 7.1	3.0 and 6.0	64	22	34	51st	Moderate
Shawano Lake	Fyke Netting	195	6.2	3.4 - 8.5	3.0 and 6.0	195	123	63	77th	Moderate - High
Shawano Lake	Electrofishing	138	5.9	3.0 - 8.1	3.0 and 6.0	138	75	54	70th	Moderate - High
Washington Lake	Fyke Netting	47	5.1	3.8 - 7.8	3.0 and 6.0	47	5	11	13th	Low
Washington Lake	Electrofishing	10	5.1	3.1 - 6.7	3.0 and 6.0	10	3	30	46th	Moderate
Loon Lake	Fyke Netting	24	6.3	4.2 - 7.4	3.0 and 6.0	24	17	71	83rd	Moderate - High
Loon Lake	Electrofishing	45	5.8	2.6 - 7.5	3.0 and 6.0	42	26	62	77th	Moderate - High

2023 ELECTROFISHING CPUE (NUMBER PER MILE)

Waterbody	CPUE Total	Percentile Rank	Overall Abundance Rating	Length Index	Length Index CPUE	Length Index Percentile Rank	Length Index Abundance Rating
Wolf River Pond	9.0	54th	Moderate	≥ 7.0 inches	-	-	-
Shawano Outlet	43.3	91st	High	≥ 7.0 inches	1.3	66th	Moderate
Shawano Lake	85.3	96th	High	≥ 7.0 inches	16.0	98th	High
Washington Lake	20.0	75th	Moderate - High	≥ 7.0 inches	-	-	-
Loon Lake	27.8	82nd	Moderate - High	≥ 7.0 inches	4.3	87th	Moderate - High

SHAWANO LAKE ELECTROFISHING TRENDS CPUE (NUMBER PER MILE)

CPUE by Year					Historical Median
2006	2010	2014	2018	2023	
22.0	27.0	30.5	32.5	85.3	30.5

SHAWANO LAKE SIZE STRUCTURE (PSD) TRENDS FYKE NETTING

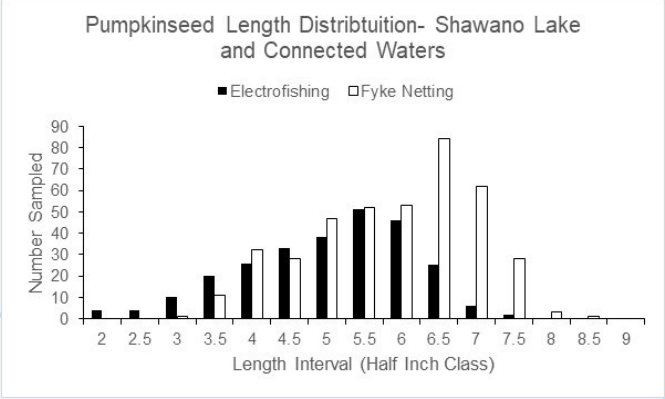
PSD by Year					Historical Median
2006	2010	2014	2018	2023	
71	61	31	71	63	63

SHAWANO LAKE ELECTROFISHING SIZE STRUCTURE (PSD) TRENDS

PSD by Year					Historical Median
2006	2010	2014	2018	2023	
64	57	67	41	54	57

SHAWANO LAKE FYKE NETTING CPUE TRENDS (NUMBER PER NET NIGHT)

2006	2010	2014	2018	2023	Historical Median	2023 Statewide Percentile Rank	2023 Abundance Rating
3.0	1.2	5.7	7.7	6.6	5.7	88th	Moderate - High



Species Summary

- Shawano Lake supports a high density pumpkinseed population with catch rates of 85.3 fish per mile of electrofishing from the boom shocking survey. Catch rates of 85.3 per mile rank in 96th percentile. Catch rates of pumpkinseed greater than 7.0 inches in the electrofishing survey was 16.0 per mile which ranks in the 98th percentile and is high when compared to lakes statewide. All of the other waterbodies throughout the study had high or moderate to high densities except for the Wolf River Pond, which was at average densities.
- Size structure of pumpkinseed in Shawano Lake and surrounding waters was characterized as moderate - high based on data from the electrofishing survey. Length data collected from the electrofishing survey in Shawano Lake resulted in a PSD value of 54 which is in the 70th percentile when compared to statewide values.
- Population trends from previous electrofishing surveys on Shawano Lake indicate that size structure has remained stable. Relative abundance has been increasing based on data from the electrofishing surveys. Snails and zebra mussels, which are a food base for the pumpkinseed have become more prevalent over the years and may be having an impact on the pumpkinseed population in a positive manner.

Yellow Perch

- Yellow perch (*Perca flavescens*) are a common panfish species found throughout many Wisconsin waterbodies. Typically yellow perch spawn in areas of emergent or submergent vegetation or submerged brush at approximately 45-50°F water temperatures. Electrofishing and fyke netting can be effective sampling gear for yellow perch and therefore, results from both gears are presented for yellow perch.

2023 SIZE STRUCTURE METRICS

Waterbody	Gear	Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock	Quality	PSD	Percentile Rank	Size Rating
Wolf River Pond	Fyke Netting	17	7.4	5.8 - 10.0	5.0 and 8.0	17	5	29	69th	Moderate - High
Wolf River Pond	Electrofishing	40	6.3	2.5 - 9.7	5.0 and 8.0	32	4	13	73rd	Moderate - High
Shawano Outlet	Fyke Netting	99	8.0	5.6 - 12.6	5.0 and 8.0	99	48	48	84th	Moderate - High
Shawano Outlet	Electrofishing	22	5.8	3.7 - 8.7	5.0 and 8.0	16	2	13	73rd	Moderate - High
Shawano Lake	Fyke Netting	9	8.1	5.0 - 10.3	5.0 and 8.0	9	5	56	88th	Moderate - High
Shawano Lake	Electrofishing	14	4.7	2.6 - 5.9	5.0 and 8.0	16	1	6	58th	Moderate
Washington Lake	Fyke Netting	65	6.1	5.1 - 7.8	5.0 and 8.0	49	0	0	-	Low
Washington Lake	Electrofishing	26	4.7	2.7 - 8.4	5.0 and 8.0	10	1	10	68th	Moderate - High
Loon Lake	Fyke Netting	7	7.4	5.6 - 10.8	5.0 and 8.0	7	3	43	81st	Moderate - High
Loon Lake	Electrofishing	36	4.4	2.1 - 6.7	5.0 and 8.0	12	0	0	-	Low

2023 ELECTROFISHING CPUE (NUMBER PER MILE)

Waterbody	CPUE Total	Percentile Rank	Overall Abundance Rating	Length Index	Length Index CPUE	Length Index Percentile Rank	Length Index Abundance Rating
Wolf River Pond	21.2	71st	Moderate - High	≥ 8.0 inches	2.1	87th	Moderate - High
Shawano Outlet	14.7	61st	Moderate	≥ 8.0 inches	1.3	77th	Moderate - High
Shawano Lake	9.3	50th	Moderate	≥ 8.0 inches	0.7	67th	Moderate - High
Washington Lake	52.0	88th	Moderate - High	≥ 8.0 inches	2.0	86th	Moderate - High
Loon Lake	22.0	73rd	Moderate - High	≥ 8.0 inches	0	-	Low

SHAWANO LAKE ELECTROFISHING TRENDS CPUE (NUMBER PER MILE)

CPUE by Year					Historical Median
2006	2010	2014	2018	2023	
17.3	10.5	24.5	28.0	20.0	20.0

SHAWANO LAKE SIZE STRUCTURE (PSD) TRENDS FYKE NETTING

PSD by Year					Historical Median
2006	2010	2014	2018	2023	
78	89	17	10	56	56

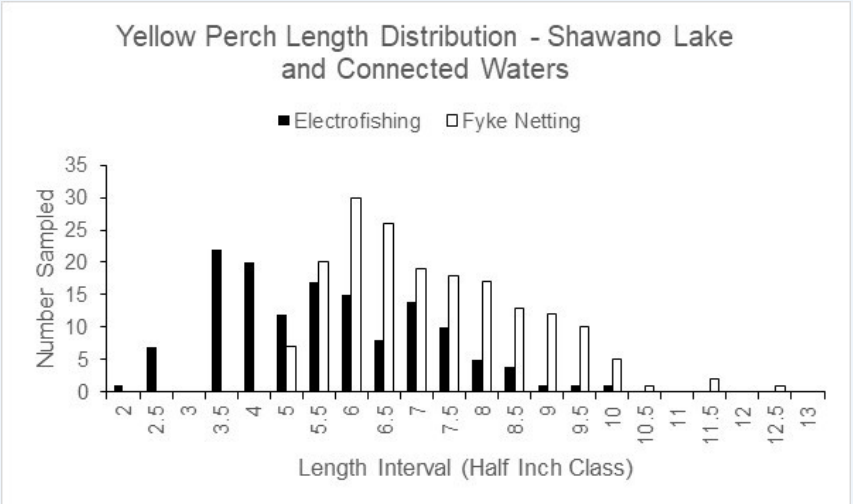
SHAWANO LAKE ELECTROFISHING SIZE STRUCTURE (PSD) TRENDS

PSD by Year					Historical Median
2006	2010	2014	2018	2023	
33	0	0	11	6	6

SHAWANO LAKE FYKE NETTING CPUE TRENDS (NUMBER PER NET NIGHT)

2006	2010	2014	2018	2023	Historical Median	2023 Statewide Percentile Rank	2023 Abundance Rating
0.6	0.2	0.2	0.2	0.3	0.2	17th	Low


Photo Credit: DNR Staff

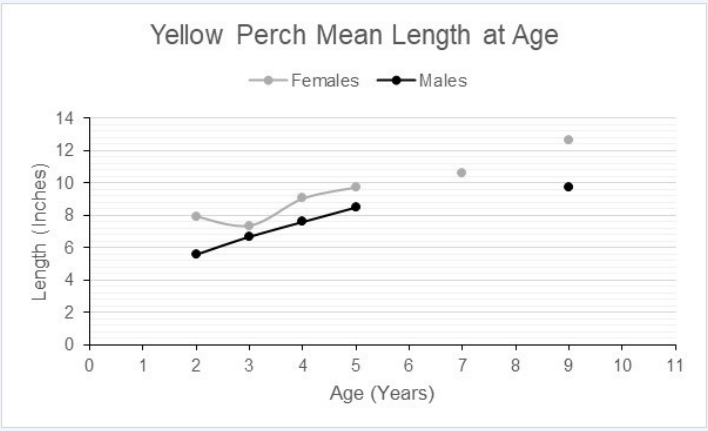


Yellow Perch

- Yellow perch (*Perca flavescens*) are a common panfish species found throughout many Wisconsin waterbodies. Typically yellow perch spawn in areas of emergent or submergent vegetation or submerged brush at approximately 45-50°F water temperatures. Electrofishing and fyke netting can be effective sampling gear for yellow perch and therefore, results from both gears are presented for yellow perch.

2023 GROWTH METRICS							
Waterbody	**Sample (n)**	**Length Bin (inches)**	**Sex**	**Mean Age**	**Age Range**	**Percentile Rank**	**Growth Rating**
Shawano Outlet	8	8.0 - 8.9	M	4.6	4 - 5	52nd	Moderate
Shawano Outlet	10	8.0 - 8.9	F	4.0	3 - 7	65th	Moderate


Photo Credit: DNR Staff



Species Summary

- Shawano Lake and connected waterbodies support a moderate to high density yellow perch population with catch rates of 0.3 fish per net night from the fyke netting survey and 9.3 per mile of electrofishing from the boom shocking survey. Catch rates of 0.3 per net night and 9.3 per mile rank in the 17th and 50th percentiles respectively. Catch rates of yellow perch greater than 8.0 inches in the electrofishing survey was 0.7 per mile which ranks in the 67th percentile and is moderate to high when compared to lakes statewide. Most of the waterbodies showed moderate to high densities of yellow perch, while have higher than average amounts of yellow perch larger than 8.0 inches.
- Size structure of yellow perch in Shawano Lake and surrounding waters was characterized as moderate - high based on data from both the fyke netting survey and electrofishing survey. Length data from the fyke netting survey resulted in a PSD value of 56 which is in the 88th percentile when compared to yellow perch fyke netting data statewide.
- Population trends from previous surveys on Shawano Lake indicate that size structure has remained stable over recent fyke netting surveys and electrofishing surveys. Relative abundance was similar for all years since 2006, but 2014 and 2018 had notably lower PSDs.
- Growth metrics calculated from age estimates indicate that yellow perch in the Shawano Outlet grow at an average pace for both male and female individuals up to 8.9 inches. Male and female yellow perch on average are able to grow near 8.0 inches in 4 years.

Full Summary

Walleye

The 2023 Shawano Lake and surrounding waters surveys show an improvement in the walleye population compared to 2018. While still below statewide averages, relative abundance in Shawano, Washington, and Loon Lakes has increased. A PSD value of 97 indicates a strong size structure. The 2023 netting survey recorded one of the highest walleye population estimates since the early 2000s, reaching 0.8 per acre. Although this falls short of the goal of 1.5 per acre, it's a positive trend.

The fall 2023 electrofishing survey failed to find young-of-the-year walleye but captured a good number of yearlings from the 2022 class. The volunteer-run lake-side hatchery (walleye wagon), along with large fingerling stocking efforts, has positively impacted the population. 66% of the 2023 walleye population in Shawano Lake consists of fish hatched in the walleye wagon, while roughly 34% are from state hatchery-raised walleye stocked biannually since 2011.

To track walleye movement, 809 individuals were implanted with PIT tags during the spring surveys. PIT tag arrays will be placed between lakes and tributaries in 2024 to gather data on spawning sites, habitat usage, and movement, aiding in population management. Further evaluation needs to be completed after the movement study to determine the most effective management option for improving the walleye fishery.


Photo Credit: DNR Staff

Muskellunge

The muskellunge population in Shawano Lake and surrounding waters is currently low-density with a poor size structure. The 2023 survey was the first of a planned two-year mark-recapture survey to estimate the adult population. This low abundance and poor size structure is likely due to no stocking efforts from 2013 to 2017. Stocking efforts have resumed since 2018. However, fish stocked since then are not yet large enough to show up in the adult populations. In 2021, we PIT tagged 1,250 large fingerling muskellunge which will help us better understand survival, movement and the musky population of Shawano Lake. We recommend continuing stocking 2,500 musky every other year and to continue evaluation including PIT tagging additional fish.

Northern Pike

Shawano Lake and connected waters support a moderate-density northern pike population with a low to moderate size structure. While individuals up to 32 inches were captured, most were between 15 and 26 inches. Age and growth analyses indicate average growth rates for northern pike in the area. Lack of suitable habitat could be a limiting factor. Enhancing existing emergent vegetation and encouraging landowners to promote vegetation in the littoral zone are recommended.

As part of our ongoing study, 433 northern pike were fitted with PIT tags to monitor their movements and locate spawning grounds. PIT tag arrays will be deployed in 2024 to facilitate these observations., a separate report will be written to describe the results.


Photo Credit: DNR Staff

Largemouth Bass

Shawano Lake and the Shawano Outlet have a moderate-density largemouth bass population that has been slowly declining since 2006. The size structure has also deteriorated. While the overall population remains healthy, continued monitoring is necessary to ensure it stays at acceptable levels.

The largemouth bass population still provides a good fishing opportunity, with an average proportion of fish 14 inches or larger. Maintaining population levels is important for both the fishery and to control panfish populations.

Full Summary

Black Crappie

The black crappie population in Shawano, Washington and Loon Lakes is healthy and should provide an excellent angling opportunity. While densities of black crappie are lower in Wolf River Pond and the Shawano Outlet, the size structure provides a chance to catch larger black crappie. The 2023 survey results indicate that black crappie population levels were moderate - high when compared to waterbodies throughout Wisconsin. Further, the catch rate of black crappie greater than 8.0 inches was moderate to high in comparison to black crappie catch rates statewide. In addition to the high relative abundance of larger black crappie, the 2023 survey results also indicate a strong year class of 6.0 - 8.0 inch fish. These will recruit to desired lengths for harvest in the near future. The moderate - high relative abundance along with the current high abundance of target size (> 8.0 inch) individuals and strong year classes of smaller fish should promote a healthy black crappie fishery on Shawano Lake and the connected waters for the next several years. Age structures show that black crappie can grow much older than previously thought, as growth rates slow down around 10.0 –11.0 inches. The picture on the right is an otolith cross section from a 12.0 inch female black crappie, which is estimated to be 19 years old. High angler pressure and harvest may be a factor influencing the low numbers of fish 12.0 inches or larger. Growth rates differed by waterbody and this implies a potential for changes in regulations could improve the fishery.

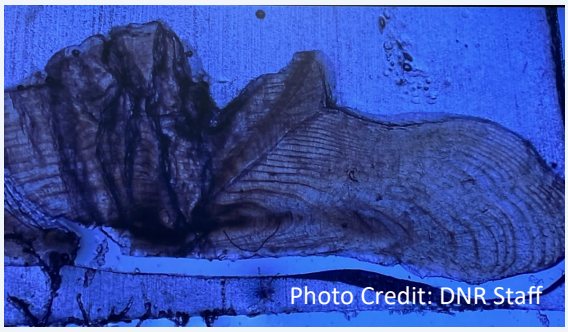


Photo Credit: DNR Staff

Bluegill

Bluegill population characteristics quantified in the 2023 Shawano Lake system survey appear to have remained relatively similar to past surveys. Relative abundance and size structure metrics have both remained moderate. Growth was assessed on bluegill using age estimates from otolith cross sections and results indicate bluegill have slow growth in Shawano, Loon and Washington Lakes compared to waterbodies statewide. However, ageing structures for bluegill in Wolf River Pond and Shawano Outlet show moderate to fast growth, with males in Wolf River Pond reaching 7.0 inches in 4.9 years. High angling pressure and harvest pressure on the larger individuals are likely driving the observed trends in the bluegill population. Although size structure of bluegill could still improve, Shawano Lake and the connected waterbodies does provide anglers a bluegill fishery with a good number of > 7.0 inch individuals. Regulation changes could benefit the populations of the Shawano Lake System.


Photo Credit: DNR Staff

Pumpkinseed

Shawano Lake and the connected waters pumpkinseed population has been improving since 2006, with a high relative abundance and high size structure rating observed in the 2023 survey. Further, the number of > 7.0 inch size individuals was moderate to high when compared to statewide pumpkinseed populations. However, recent survey data indicate the pumpkinseed population is trending positively in Shawano Lake. High quantities of snails and invasive zebra mussels could be playing a role in the improved pumpkinseed fishery, as this is a preferred food source for the pumpkinseed. Improvements to nearshore habitat such as the addition of tree drops or fish sticks could benefit both panfish and predatory species in the Shawano Lake system.

Yellow Perch

Data from the 2023 Shawano Lake System comprehensive survey indicates that the yellow perch population has remained stable from surveys dating back to 2006. Relative abundance is considered moderate to high when compared to yellow perch populations statewide, while providing the opportunity to catch yellow perch greater than 10.0 inches. Of note, the PSD value in the Outlet Channel of 48 indicates a high size structure rating when compared to other lakes statewide. Growth was assessed on yellow perch using age estimates from otolith cross sections. Age samples were collected from the Outlet Channel and showed that male and female yellow perch were able to reach 8.0 inches in 4 - 5 years.

Photo Credit: DNR Staff